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Case report

Pseudomonas aeruginosa costovertebral arthritis in association with spontaneous cervical spondylodiscitis and epidural abscesses in the elderly

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ABSTRACT

Cervical spondylodiscitis is an uncommon skeletal infection and its association with *Pseudomonas aeruginosa* has only been described in isolated case reports. Causes of cervical spondylodiscitis in these patients have been identified, except for the present case. A man aged 78 years with no significant previous medical history presented with an 8-week history of cervical pain and bilateral C5-7 radiculopathy. Magnetic resonance imaging revealed epidural abscesses and the destruction of C7 and T1 vertebrae, the interposing disc, and bilateral costovertebral joints. *P aeruginosa* was grown from open biopsy tissues and intravenous antibiotics were then administered to treat the infection. At the end of the 12-month follow-up period, all presenting symptoms had resolved and inflammatory markers (erythrocyte sedimentation rate and C-reactive protein) were within the normal ranges. Despite the infrequent incidence of cervical spondylodiscitis, it should be considered in elderly patients in whom risk factors are not found but unrelenting neck or back pain is reported.

1. Introduction

Spondylodiscitis, also known as vertebral osteomyelitis or infectious discitis, is uncommon and responsible for 1%–7% of skeletal infections.[1–4] It is most commonly found in the lumbosacral region (58%–73%), followed by thoracic (14%–30%) and cervical spines (11%).[3,5] Common predisposing factors include diabetes mellitus, immunosuppression, rheumatic diseases, intravenous drug use, prior instrumentation of gastrointestinal, genitourinary, and respiratory tracts, and urogenital infection.[6,7] Back pain on the affected vertebrae is the most common presenting symptom and is found in 78%–100% of the patients with spondylodiscitis.[8,9] Conversely, fever has only been reported in 10%–60% of the cases[2,5,10] and only around one-third of the patients have neurologic deficits on presentation.[10]

Cervical spondylodiscitis infected by *Pseudomonas aeruginosa* is rare and only individual cases are reported so far (Table 1).[11–19] Sources of infection in these individuals can be identified, except the present case.

2. Case report

A man who was 78 years of age without any significant previous medical history presented to the emergency department with 8 weeks of progressively worsening neck pain and paresthesia involving both shoulders and lateral aspects of both forearms and hands. The patient denied any recent dental therapy and invasive medical procedures, domestic and overseas travels, and traumatic injuries. This patient was initially treated by his primary care physician for degenerative cervical vertebral joints based on radiological evidence of degenerative cervical vertebrae in plain radiographs. However, there was no significant improvement.

On admission, the patient's temperature was 37° C, heart rate was 92 beats/minute with regular rhythm, blood pressure was 147/78 mm Hg, respiratory rates were 18 breaths/minute, and oxygen saturation on room air was 98%. His dentition and oral hygiene were good. Neck pain was elicited during both passive and active movement of the neck and the palpation to low cervical vertebrae. Paresthesia remained in the C5, C6, and C7 nerve root distributions, but no other sensory deficits were found. Motor functions, reflexes, and coordination were normal in both upper and lower limbs. The patient's lungs were clear, and heart sounds were regular rate and rhythm with no murmurs. Computed tomography (CT) of the cervical spine was performed and showed a destructive lesion in the C7/T1 disc space associated with adjacent endplate erosion and

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Table 1
Case reports of cervical spondylodiscitis associated with *Pseudomonas aeruginosa*.

Series (reference)	Age (y)/sex	Clinical symptoms	Predisposing risk factors	Location	Complication	Source of recovery	Route	Therapy	Outcome
Salahuddin *et al.*[16]	47/M	Neck pain	IVDU	C4-C5	Vertebral destruction	Spine	HS	Debridement and gentamicin (80 mg IM every 6 hr for 6 wk) and anti-tuberculous therapy[a]	Recovery
Wiesseman *et al.*[18]	36/M	Neck pain and neck stiffness	IVDU	C5	Vertebral and disc destruction	Spine and prevertebral soft tissue	HS	Gentamicin (150 mg IV every 8 hr for 7 wk) and carbenicillin (10 g every 6 hr for 45 d)	Recovery
Bryan *et al.*[11]	50/M	Neck pain, bilateral upper limb muscle weakness	IVDU	C6-C7	HEM[b], vertebral, and disc destruction	Spine	HS	Debridement and carbenicillin[a] (24 g IV every 24 hr)	NR
Jabbari and Pierce[12]	45/M	Fever and neck pain	IVDU	C3-C6	Vertebral and disc destruction	Spine	NR	Debridement and gentamicin[a] (80 mg every 8 hr for 4 wk)	Paraplegia
Pinckney *et al.*[15]	11/M	Fevers and neck pain	Dental extraction	C3-C6	Vertebral and disc destruction	Spine, blood	HS	Carbenicillin[a] (IV for 21 d), immobilization	Limitation in the range of the movement of the neck
Maher *et al.*[13]	41/M	Facial injuries and cerebral contusion	Aspiration pneumonia	C3-C4	Vertebral and disc destruction	Spine and sputum	HS	Tobramycin (100 mg IV every 8 hr for 6 wk), Ticarcillin (3 g IV every 4 hr for 6 wk), cervical immobilization for 6 wk	Hypoxic brain injury, labile emotion, and dependent mobility functions
Yang and Neuwirth[19]	73/M	Neck pain, radicular pain	None	C3-C4	Prevertebral soft tissue mass, vertebral and disc destruction, epidural abscess	Urine, spine	HS	Debridement, Tobramycin[a], cefazolin[a], and ticarcillin[a]	Death
Paul *et al.*[14]	54/M	Neck pain, left ear discharge, restriction of neck movement and fever	Diabetics, chronic suppurative otitis media	C2-C4	Retropharyngeal abscess and vertebral destruction	Spine, ear swab	HS	Debridement, cervical immobilization, Ciprofloxacin (500 mg orally every 12 hr for 3 mo), mastoidectomy and tympanoplasty	Recovery
Walters *et al.*[17]	18/M	Neck pain, shoulder pain with dysphagia	Dental extraction	C3-C5	Anterior epidural abscess	Spine	HS	Ceftazidime (2 g IV every 8 hr for 6 wk), debridement, spondylodesis	Recovery
	23/F	Neck pain	Dental extraction	C4-C5	Posterior epidural abscess	Spine	HS	Ciprofloxacin (500 mg orally every 12 hr for 6 wk) aztreonam (2 g IV every 8 hr for 6 wk), metronidazole 500 mg orally every 8 hr for 6 wk), debridement, spondylodesis	Recovery
Present case	78/M	Neck pain and radiculopathy	None	C6-T2	Prevertebral soft tissue mass, vertebral and disc destruction, epidural abscess	Spine	Unknown	Ticarcillin/clavulanate (3.1 g IV every 6 hr for 6 wk), ciprofloxacin (500 mg orally every 12 hr for 3 mo), immobilization	Recovery

HEM = heterogenous extradural mass consisting of disc and bone materials and soft tissues; IVDU = intravenous drug user; HS, hematogenous spread; NR, not recorded; IV, intravenously; IM, intramuscularly.
[a] Antituberculous therapy: patient was tested positive in a purified protein derivative skin test and then treated with isoniazid, ethambutol and streptomycin.
[b] Antimicrobial regimens are not completely recorded.

anterior epidural soft tissue swelling. A provisional diagnosis of cervical spondylodiscitis was made. Following CT of the cervical spine, laboratory investigations on the day of admission showed the white blood cell count of 7.0 $\times$ 10^9/L (64% neutrophils), an erythrocyte sedimentation rate (ESR) of 55 mm/hour and C-reactive protein (CRP) of 40 mg/L, hemoglobin of 120 g/L, sodium 142 mmol/L, and potassium of 4.0 mmol/L. Total bilirubin, liver transaminases, albumin, protein, and renal function tests were within normal ranges. Fungal and bacterial cultures of blood and urine were also obtained on the same day and later found to be negative.

On the second day of the admission, magnetic resonance imaging (MRI) of the cervical spine confirmed a destructive lesion at the C7/T1 level with the erosion of adjacent endplates, both medial ends of the first ribs and adjacent costovertebral joints (Fig. 1). Further, prevertebral tissue swelling and anterior and posterior epidural abscess collection, which extended from the level of C6 to T2 and led to moderate spinal canal stenosis, were also shown in the MRI (Fig. 1).

The patient then underwent open biopsy, and C7/T1 disc and vertebral materials later yielded no bacteria in the Gram stain but heavy growth of *P aeruginosa*, which was sensitive to ceftazidime, ciprofloxacin, gentamicin, and ticarcillin/clavulanate. Considering his age and moderate to severe degenerative changes of his cervical vertebrae, surgical debridement was not considered. Instead, he was treated with intravenous ticarcillin/clavulanate 3.1 grams every 6 hours for 6 weeks, followed by oral ciprofloxacin 500 mg every 12 hours for another 3 months after consulting infectious disease specialists. Bacterial cultures of repeat urine and blood cultures every 8 weeks were negative over a period of 12 months. Repeat ESR and CRP values have improved over time, and both tests at the end of the 12-month follow-up period were within normal limits (ESR, 8.3 mm/hour; CRP, 3.4 mg/L). Additionally, his symptoms have completely resolved and no sign of relapse was identified.

3. Discussion

The annual incidence of spondylodiscitis has been estimated around 2.4 individuals per 100,000 people, and the incidence rises with the increase of ages (6.5 cases per 100,000 population above the age of 70 years).[20] Pyogenic spondylodiscitis is generally caused

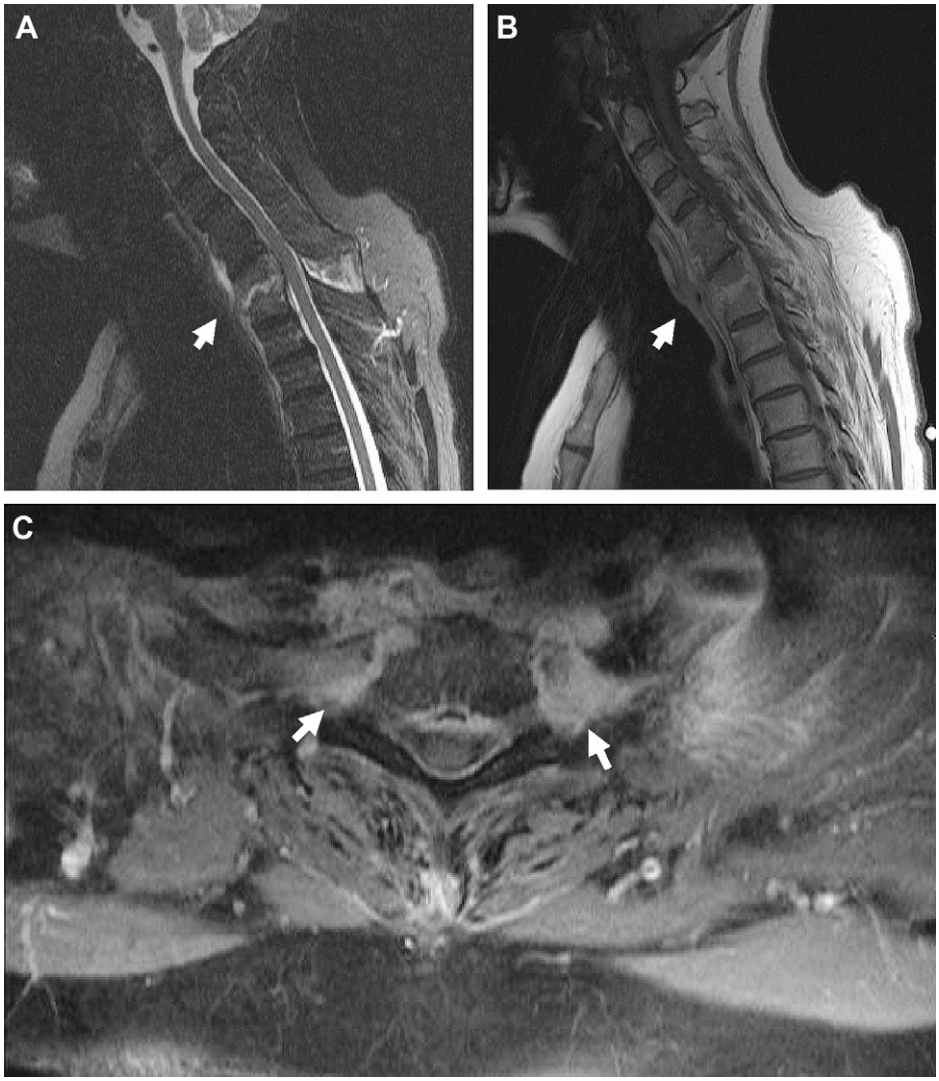

Fig. 1. (A) Sagittal T2-weighted; and (B) sagittal T1-weighted sagittal magnetic resonance images with gadolinium enhancement that demonstrates a high signal lesion at the C7/T1 disc space associated with the disc and endplate destruction as well as the anterior and posterior epidural abscesses (arrows); (C) axial gadolinium–enhanced T1-weighted image reveals the destruction of the bilateral first costovertebral joints (arrows).

by hematogenous spread, direct contiguous spread from the infection site, or direct inoculation during spinal surgery. Common primary infectious sites include skin, urinary tract, and sites of vascular access and spinal operations, although they are only identified in 51% of the cases.[5,10,21]

Cervical vertebrae are the least most common site of spondylodiscitis, accounting for approximately 11% of the individuals with spondylodiscitis.[5] Nevertheless, cervical spondylodiscitis associates with the highest rate of neurologic impairment (found in 44% of the patients with cervical spondylodiscitis) in a study involving 253 patients with vertebral osteomyelitis.[21] Despite the high incidence of neurologic complications related to cervical spondylodiscitis, a considerable diagnostic delay has been reported between 6 weeks and 6 months.[2,22–25] This is mainly due to its subacute nature, including frequent lack of fever[2,5,10,26] and unspecific clinical symptoms, such as back pain.[2,8,9] Additionally, spondylodiscitis can further be complicated by epidural and paravertebral abscesses, which are believed to be caused by direct contiguous spread of the pathogens from adjacent vertebrae and have been reported in 17% and 26% of the patients with spondylodiscitis, respectively.[21]

MRI is the diagnostic imaging of choice for spondylodiscitis. It has high sensitivity (96%), specificity (93%), and accuracy (90%–94%).[27–29] However, blood culture (yield rates: 30%–78%)[5] and tissue biopsy (yield rates: 47%–90%),[5,29–31] via either image-guided or open techniques, remain the most significant diagnostic methods because positive results will not only confirm the imaging diagnosis but further guide the choice of antibiotics.

Intravenous antibiotics have been the most important treatment for spondylodiscitis, although the optimal duration of antimicrobial treatment has not been verified in large randomized controlled studies. The current recommended treatment period ranges from 4 weeks to 3 months.[32,33] A longer duration is generally required if the abscesses are not drained.[34] The recovery rates (i.e., no signs and symptoms of active infection) at 6 months and 1 year are approximately 91% and 88%, respectively, with the minimum duration of 4-week antibiotic treatment, in two retrospective studies.[21,35] However, empiric use of antibiotics should only be considered in patients with sepsis and unstable clinical conditions. In this case, ticarcillin/clavulanate, and later ciprofloxacin, was used by infectious disease specialists based on the antibiotic susceptibility testing results.

P aeruginosa is an important opportunistic nosocomial pathogen, and it does not usually cause infection in healthy individuals.[36] However, it typically causes the infection in wounds, burns, respiratory system of patients on mechanical ventilation, and genitourinary system after instrumentation.[36] Cervical spondylodiscitis due to pseudomonal infection is rarely encountered before the 1960s.[17,19] Since then, there have been a few reports on *P aeruginosa* spondylodiscitis of the cervical spine in intravenous drug users, individuals after dental surgery, ear, and urinary tract infections, and traumatic facial injury (Table 1).[11–19]

This case poses a challenge to clinicians in terms of the early diagnosis of septic costovertebral arthritis and cervical spondylodiscitis considering the patient's unspecific clinical symptoms, the lack of obvious predisposing factors and fever, and common degenerative changes of cervical vertebrae in the elderly. High clinical suspicion of spondylodiscitis should remain when reviewing neck or back pain in elderly patients with or without risk factors of this pathology.

4. Conclusion

In conclusion, this is a rare case of a man aged 78 years who had no risk factors of spondylodiscitis but later developed *P aeruginosa* cervical spondylodiscitis and its complications. Although it is uncommon, cervical spondylodiscitis and its associated complications should be considered in the differential diagnosis of relentless cervical vertebral pain in an elderly patient.

References

1. Acosta Jr FL, Chin CT, Quiñones-Hinojosa A, Ames CP, Weinstein PR, Chou D. Diagnosis and management of adult pyogenic osteomyelitis of the cervical spine. *Neurosurg Focus* 2004;**17**:E2.
2. Bateman JL, Pevzner MM. Spinal osteomyelitis: a review of 10 years' experience. *Orthopedics* 1995;**18**:561–5.
3. D'Agostino C, Scorzolini L, Massetti AP, Carnevalini M, d'Ettorre G, Venditti M, et al. A seven-year prospective study on spondylodiscitis: epidemiological and microbiological features. *Infection* 2010;**38**:102–7.
4. Schimmer RC, Jeanneret C, Nunley PD, Jeanneret B. Osteomyelitis of the cervical spine: a potentially dramatic disease. *J Spinal Dis Tech* 2002;**15**:110–7.
5. Mylona E, Samarkos M, Kakalou E, Fanourgiakis P, Skoutelis A. Pyogenic vertebral osteomyelitis: a systematic review of clinical characteristics. *Sem Arthritis Rheum* 2009;**39**:10–7.
6. Küker W, Mull M, Mayfrank L, Töpper R, Thron A. Epidural spinal infection. Variability of clinical and magnetic resonance imaging findings. *Spine* 1997;**22**:544–50.
7. Marella CP, Hasan S, Habte-Gabr E. Report of 2 cases of vertebral osteomyelitis/discitis caused by *Enterococcus faecalis* in dialysis patients. *Infect Dis Clin Pract* 2007;**15**:199–200.
8. Meyers SP, Wiener SN. Diagnosis of hematogenous pyogenic vertebral osteomyelitis by magnetic resonance imaging. *Arch Inter Med* 1991;**151**:683–7.
9. Patzakis MJ, Rao S, Wilkins J, Moore TM, Harvey PJ. Analysis of 61 cases of vertebral osteomyelitis. *Clin Orthopaed Rel Res* 1991;**264**:178–83.
10. Priest DH, Peacock Jr JE. Hematogenous vertebral osteomyelitis due to *Staphylococcus aureus* in the adult: clinical features and therapeutic outcomes. *South Med J* 2005;**98**:854–62.
11. Bryan V, Franks L, Torres H. *Pseudomonas aeruginosa* cervical diskitis with chondro-osteomyelitis in an intravenous drug abuser. *Surg Neurol* 1973;**1**:142–4.
12. Jabbari B, Pierce JF. Spinal cord compression due to pseudomonas in a heroin addict. Case report. *Neurology* 1977;**27**:1034–7.
13. Maher DP, Rappaport NH, Kopaniky DR. *Pseudomonas* cervical osteomyelitis in a polytrauma patient. *J Trauma Injury Infect Crit Care* 1987;**27**:1301–4.
14. Paul CA, Kumar A, Raut VV, Garhnam A, Kumar N. *Pseudomonas* cervical osteomyelitis with retropharyngeal abscess: an unusual complication of otitis media. *J Laryngol Otol* 2005;**119**:816–8.
15. Pinckney LE, Currarino G, Highgenboten CL. Osteomyelitis of the cervical spine following dental extraction. *Radiology* 1980;**135**:335–7.
16. Salahuddin NI, Madhavan T, Fisher EJ, Cox F, Quinn EL, Eyler WR. *Pseudomonas* osteomyelitis. Radiologic features. *Radiology* 1973;**109**:41–7.
17. Walters HL, Measley R. Two cases of *Pseudomonas aeruginosa* epidural abscesses and cervical osteomyelitis after dental extractions. *Spine* 2008;**33**:E293–6.
18. Wiesseman GJ, Wood VE, Kroll LL, Linda L. *Pseudomonas* vertebral osteomyelitis in heroin addicts. Report of five cases. *J Bone Joint Surg Am* 1973;**55**:1416–24.
19. Yang EC, Neuwirth MG. *Pseudomonas aeruginosa* as a causative agent of cervical osteomyelitis. Case report and review of the literature. *Clin Orthopaed Rel Res* 1988;**231**:229–33.
20. Grammatico L, Baron S, Rusch E, Lepage B, Surer N, Desenclos JC, et al. Epidemiology of vertebral osteomyelitis (VO) in France: analysis of hospital-discharge data 2002-2003. *Epidemiol Infect* 2008;**136**:653–60.
21. McHenry MC, Easley KA, Locker GA. Vertebral osteomyelitis: long-term outcome for 253 patients from 7 Cleveland-area hospitals. *Clin Infect Dis* 2002;**34**:1342–50.
22. Kern RZ, Houpt JB. Pyogenic vertebral osteomyelitis: diagnosis and management. *Canadian Med Assoc J* 1984;**130**:1025–8.
23. Nolla JM, Ariza J, Gomez-Vaquero C, Fiter J, Bermejo J, Valverde J, et al. Spontaneous pyogenic vertebral osteomyelitis in nondrug users. *Sem Arthritis Rheum* 2002;**31**:271–8.
24. Osenbach RK, Hitchon PW, Menezes AH. Diagnosis and management of pyogenic vertebral osteomyelitis in adults. *Surg Neurol* 1990;**33**:266–75.
25. Torda AJ, Gottlieb T, Bradbury R. Pyogenic vertebral osteomyelitis: analysis of 20 cases and review. *Clin Infect Dis* 1995;**20**:320–8.
26. Kourbeti IS, Tsiodras S, Boumpas DT. Spinal infections: evolving concepts. *Curr Opin Rheumatol* 2008;**20**:471–9.
27. Modic MT, Feiglin DH, Piraino DW, Boumphrey F, Weinstein MA, Duchesneau PM, et al. Vertebral osteomyelitis: assessment using MR. *Radiology* 1985;**157**:157–66.
28. Morgenlander JC, Rozear MP. Disc space infection: a case report with MRI diagnosis. *Am Fam Physician* 1990;**42**:983–6.
29. Palestro CJ, Love C, Miller TT. Infection and musculoskeletal conditions: imaging of musculoskeletal infections. *Best Pract Res Clin Rheumatol* 2006;**20**:1197–218.
30. Bontoux D, Codello L, Debiais F, Lambert de Cursay G, Azais I, Alcalay M. Infectious spondylodiscitis. Analysis of a series of 105 cases. *Revue Rhumat Malad Osteo Articul* 1992;**59**:401–7.

31. Chew FS, Kline MJ. Diagnostic yield of CT-guided percutaneous aspiration procedures in suspected spontaneous infectious diskitis. *Radiology* 2001;**218**:211–4.
32. Livorsi DJ, Daver NG, Atmar RL, Shelburne SA, White Jr AC, Musher DM. Outcomes of treatment for hematogenous *Staphylococcus aureus* vertebral osteomyelitis in the MRSA ERA. *J Infect* 2008;**57**:128–31.
33. Perronne C, Saba J, Behloul Z, Salmon-Ceron D, Leport C, Vilde JL, et al. Pyogenic and tuberculous spondylodiskitis (vertebral osteomyelitis) in 80 adult patients. *Clin Infect Dis* 1994;**19**:746–50.
34. Kowalski TJ, Berbari EF, Huddleston PM, Steckelberg JM, Mandrekar JN, Osmon DR. The management and outcome of spinal implant infections: contemporary retrospective cohort study. *Clin Infect Dis* 2007;**44**:913–20.
35. Roblot F, Besnier JM, Juhel L, Vidal C, Ragot S, Bastides F, et al. Optimal duration of antibiotic therapy in vertebral osteomyelitis. *Sem Arthritis Rheum* 2007;**36**:269–77.
36. Moore NM, Flaws ML. Epidemiology and pathogenesis of *Pseudomonas aeruginosa* infections. *Clin Lab Sci* 2011;**24**:43–6.